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**PRE-APPEAL BRIEF REQUEST FOR REVIEW**Docket Number (Optional)  
04-708

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on \_\_\_\_\_

Signature \_\_\_\_\_

Typed or printed  
name \_\_\_\_\_

Application Number  
10/506,559

Filed  
9-2-06

First Named Inventor  
Westhall

Art Unit  
2883

Examiner  
T. Rude

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

/A. Blair Hughes/

Signature

☐ assignee of record of the entire interest.  
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.  
(Form PTO/SB/95)

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Registration number if acting under 37 CFR 1.34 \_\_\_\_\_

June 10, 2008

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required.  
Submit multiple forms if more than one signature is required, see below.

☐ \*Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
(Case No. 04-708)

In the Application of:	)	
	)	
Jonathan James Westhall	)	Examiner: T. Rude
	)	
Serial No. 10/506,559	)	
	)	Group Art Unit: 2883
Filed: September 2, 2006	)	
	)	Conf. No. 1300
Title: Optical Fibre Sensor Assembly	)	

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**PRE-APPEAL BRIEF REQUEST FOR REVIEW REMARKS**

Pre-appeal brief review is requested for the above application. This paper sets forth Applicant's concise statement of clear errors in the Examiner's final rejection.

**I. BACKGROUND**

Claims 60-67 and 81-82 stand rejected under 35 U.S.C 103 (a) as being unpatentable over US 5,475,216 (Danver) in view of US 5,639,968 (Bobb). The application includes a single independent claim 60 which is reproduced below.

60. An optical hydrophone assembly comprising:  
a plurality of optical fibre hydrophone sensor coils, responsive to imposed strain to produce a change in phase of an optical signal passing therethrough, said hydrophone sensor coils being longitudinally spaced optically coupled by optical fibre; and  
an elongate support element, on which said plurality of optical fibre sensor coils and optically coupling optical fibre are mounted; wherein said support element has an elastic limit such that when said support element is bent away from the elongate axis, the optical fibre fracture limit is reached before the elastic limit is reached.

**II. THE INVENTION**

The claimed invention is directed generally to optical hydrophone assemblies for sensing acoustic signals by virtue of a change in strain produced in a fibre coil caused by incident sound waves in the medium being sensed. Changes of strain in the fibre coil are measured by the phase

change observed in light travelling through the coil. It is known to be advantageous to provide arrays of such hydrophones, however a difficulty exists in providing an appropriate means for linking the hydrophones structurally, while at the same time reducing spurious readings from the linking fibre, and maintaining sufficient flexibility for use on board a ship or other vessel.

The presently claimed invention proposes the novel arrangement of a plurality of optical fibre hydrophone sensor coils mounted on an elongate support element. The fact that the coils are all mounted on a single support rod or element provides effective structural support, and reduced acceleration effects in the fibers between coils.

A single elongate support might at first sight appear inappropriate since hydrophone arrays can be of significant length and are commonly stored in a curved configuration on a spool. The present invention however ingeniously uses a support element having an extremely high degree of flexibility in relation to the optic fiber coils it supports, e.g., a carbon fibre rod. Such a member running through both coil portions and connecting portions overcomes or ameliorates the problems noted above.

### **III. TRAVERSE OF THE OBVIOUSNESS REJECTION**

Claims 60-67 and 81-82 stand rejected under 35 U.S.C 103(a) as being unpatentable over US 5,475,216 (Danver) in view of US 5,639,968 (Bobb). The Danver reference is cited against the patentability of the claims for the first time in the Final Rejection. The pending claims are non-obvious and patentable because (1) the examiner has not made out a *prima facie* case of obviousness; (2) the combination of the teachings of the prior art would result in an inoperable device; and (3) one of ordinary skill in the art at the time of the invention would not combine the references as the examiner has.

#### **A. There Is No *Prima Facie* Case Of Obviousness**

All pending claims must be allowed at least because the examiner has not made out a *prima facie case* of obviousness. One important feature of the claimed invention that is not disclosed or suggested in the prior art is the relationship between the elastic limit of the elongate support element and the fiber optic failure point. The claims set forth that “the optical fibre fracture limit is reached before the elastic limit is reached.” The prior art does not disclose or suggest this relationship. Specifically, Danver discloses a hydrophone array having a plurality of

mandrel/sensing fiber elements separated by spacers. Bobb, on the other hand, discloses a stand-alone strain-to-failure sensor for detecting whether or not a region of a structure has exceeded a predetermined amount of strain. Based upon the teachings of the prior art, one skilled in the art at the time of the invention who might consider combining Danver and Bobb would add the Bobb strain-to-failure sensor as a stand-alone device – separate from the Danver fiber optic sensor. There is no *prima facie* case of obviousness because the examiner has not explained why one skilled in the art at the time of the invention would use the Bobb stand-alone strain-to-failure sensor in the Danver device in a manner not taught by Bobb. As a result, all pending claims are non-obvious and must be allowed.

**B. The Combined References Form A Non-Operative Embodiment**

The pending claims are also non-obvious because the modification of Danver with the Bobb fracture strain gauge would not result in the claimed invention. Bobb notes that fracture strain levels of typical optic fibers can be relatively high, and suggests that if lower levels of strain are to be detected by fiber failure, then a reduced cross section portion of the fiber should be introduced. Applying this teaching to Danver then, would result in a plurality of fiber coils wrapped around a mandrel that each have one or more ‘necks’ or thinned, weakened portions in the fiber. Such portions would severely and undesirably affect the interferometric sensing capabilities of the fiber, and would likely render the hydrophone useless. One of ordinary skill in the art at the time of the invention would understand this negative effect of thinned portions of the fiber and would, therefore, not modify Danver with Bobb as the examiner suggest.

**C. One Skilled In The Art At The Time Of The Invention Would Not Combine The References As The Examiner Has**

All pending claims are further non-obvious because one skilled in the art would not be motivated to combine Danver with Bobb in the first place. Danver discloses a hydrophone assembly in which a plurality of sensing coils are wrapped on each mandrel section. Bobb, on the other hand does not discloses a hydrophone. Instead, Bob discloses a fiber optic sensor for determining whether a structure has exceeded a predetermined amount of strain. In this regard, the technical fields of Danver and Bobb are completely different.

The Examiner acknowledges the dramatic differences in the technical fields of the two prior art references at the bottom of page 2 of the Action, where it is stated that:

Denver's invention is designed to determine the magnitude of the acoustic disturbance that generates an optical signal, and not to act as a fibre failure sensor.

The examiner then, at the top of page 3, describes the teaching of Bobb as:

... a modified optical fiber sensor...having a strain failure point equal to a predetermined amount of strain.

Despite these dramatic differences in the purposes of the two prior art reference, the examiner goes on to conclude:

It therefore would have been obvious to one of ordinary skill in the art...to use the optical fiber strain-to-failure sensor as suggested by Bobb to modify Denver's invention so that one may... establish whether the structural member has exceeded the predetermined amount of strain.

It is respectfully submitted that the person skilled in the art considering the design of a hydrophone assembly would have no motivation, desire or use for information concerning apparatus which detects deformation by sensing the failure of an optic fibre. Similarly, when considering strain failure gauges, the skilled person would find no reason to refer to interferometric sensors. There is clearly no support for the examiner's combination of references other than an improper hindsight review of the prior art with the Applicant's invention in mind. The Examiner appears to have found two prior art documents acknowledged to be in different technical fields, and immediately concludes that it would be obvious to combine them, without providing any logic, reasoning, motivation, or suggestion as to why a person skilled in the art at the time of the invention would be aware of both documents, an in particular Bobb, in the first place.

In the absence of any explicit analysis to the contrary, it is considered that it would not be obvious to combine the cited prior art by virtue of the fact that the respective technical fields are so far removed. This general technological gulf becomes even more apparent when considering the particular features of the prior art at a more detailed level, as is explained below.

Bobb provides the example of aircraft parts as a practical application of it strain-to-failure sensor. Applicant cannot however conceive of any practical situation in which it would be

desirable to monitor a mandrel or other support member of an interferometric hydrophone for advanced warning of impending failure, and such a situation is certainly not addressed by the present invention. Simply stated, strain-to-failure monitoring of the mandrel is unnecessary and unwanted.

In a hydrophone of the type illustrated in Danver, the optic fiber is the most critical component, and any supporting structure is typically designed to provide protection for and promote the acoustic sensing properties of the fiber. Failure of the fibre results in complete failure of the hydrophone, and design of the hydrophone should ensure that such failure will not occur under normal operating conditions. Bobb, in contrast, proposes the use of a fiber optic as an expendable addition to a component or device to be monitored. In Danver, the fiber is an integral and critical part of that component or device. As such the two different uses of fiber optics are incompatible. For these reasons it is submitted that the skilled person would strongly reject any suggestion that the teachings of Danver and Bobb be combined.

## CONCLUSION

Pending application claims 60-67 and 81-82 are non-obvious and patentable for each of the reasons recited above.

Respectfully submitted,

**McDONNELL BOEHNEN  
HULBERT & BERGHOFF**

Dated: June 10, 2008

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